



AV Keynote Legend	
Key Value	Keynote Text
1	AV JUNCTION BOX. MOUNT 6" X 8" JUNCTION BOX @ 18" A.F.F. IN WALL WHERE SHOWN. ROUTE 1" CONDUIT TO ABOVE ACT CEILING FOR DIGITAL MICROPHONE CABLING. BOX PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR.
2	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO [AV] BOX BEHIND AV EQUIPMENT RACK (SEE KEYNOTE #1). PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
3	AV EQUIPMENT RACK. MOUNT MIDDLE ATLANTIC DWR WALL MOUNT SERIES RACK MOUNTED ON WALL WHERE SHOWN. PROVIDE (3) 1" CONDUIT STUB UP TO ABOVE ACCESSIBLE CEILING. PROVIDE (2) 120V 20A CIRCUITS FOR AV COMPONENT POWER. BOXES AND POWER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. AV EQUIPMENT RACK PROVIDED AND INSTALLED BY AV CONTRACTOR.
4	AV EQUIPMENT RACK. MOUNT MIDDLE ATLANTIC SRSR SERIES RACK IN MILLWORK CABINET WHERE SHOWN. PROVIDE (2) 120V 20A CIRCUITS FOR AV COMPONENT POWER. BOXES AND POWER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. AV EQUIPMENT RACK PROVIDED AND INSTALLED BY AV CONTRACTOR.
6	AV WALL REMOTE. MOUNT 2 GANG BOX @ 18" A.F.F. [AV] AND 2 GANG BOX @ 48" A.F.F. [RM] IN WALL WHERE SHOWN. CONNECT [RM] TO [AV] WITH 1" CONDUIT. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH FROM [RM] TO AV EQUIPMENT RACK IN A41 AV COMM ROOM. BOXES AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. AV DEVICES PROVIDED AND INSTALLED BY AV CONTRACTOR.
7	CAMERA WALL BOX. MOUNT 2 GANG BOX AT 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO [AV] BOX BEHIND AV EQUIPMENT RACK. BOX AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. FTZ CAMERA AND WALL MOUNTING DEVICE PROVIDED AND INSTALLED BY AV CONTRACTOR.
8	CAMERA WALL BOX. MOUNT 2 GANG BOX AT 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO [AV] BOX ON TEACHING WALL (SEE KEYNOTE #2). BOX AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. FTZ CAMERA AND WALL MOUNTING DEVICE PROVIDED AND INSTALLED BY AV CONTRACTOR.
9	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO NEAREST IT/COMM CLOSET AND 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO AV EQUIPMENT RACK IN A41 AV COMM ROOM. PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
10	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO NEAREST IT/COMM CLOSET. PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
11	PORTABLE INTERACTIVE VIEWBOARD ON CART. PROVIDED AND CONFIGURED BY AV CONTRACTOR.
12	FLAT PANEL DISPLAY [DIGITAL SIGNAGE]. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO NEAREST IT/COMM CLOSET. PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
14	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO [FPD] ON TEACHING WALL (SEE KEYNOTE #10). PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND SWIVEL WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
15	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO NEAREST IT/COMM CLOSET. ROUTE 1" CONDUIT TO FLOOR BOX BELOW CONFERENCE TABLE. PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR.
22	AV WALL REMOTE. MOUNT 2 GANG BOX @ 18" A.F.F. [AV] AND 2 GANG BOX @ 48" A.F.F. [RM] IN WALL WHERE SHOWN. CONNECT [RM] TO [AV] WITH 1" CONDUIT. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH FROM [RM] TO ADJACENT [FPD]. BOXES AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. AV DEVICES PROVIDED AND INSTALLED BY AV CONTRACTOR.
23	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO [AV] ON TEACHING WALL (SEE KEYNOTE #2). PROVIDE 120V 15A RECEPTACLE ADJACENT TO [FPD] FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.



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Revisions		
No	Description	Date
1	Revision 1	11/02/2022
2		
3	Revision 3	12/09/2022

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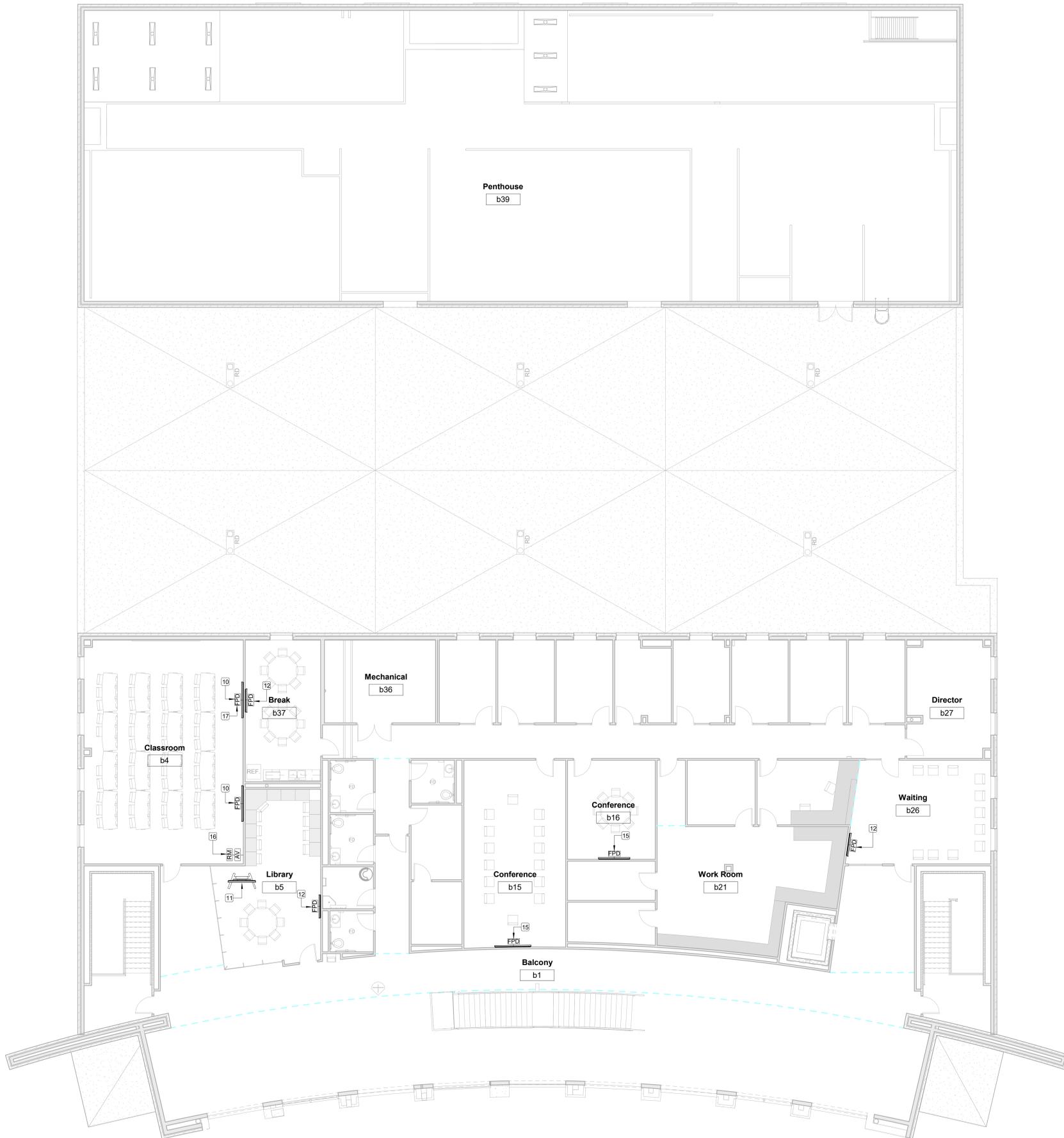
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**AV100**  
AV 1ST FLOOR PLAN

Drawn By	Checked By	Date
Author		11/11/2022

Scale	Project Number
1/8" = 1'-0"	16014.00

1 AV 1ST FLOOR PLAN  
SCALE: 1/8" = 1'-0"



AV Keynote Legend	
Key Value	Keynote Text
10	FLAT PANEL DISPLAY, MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO NEAREST IT/COMM CLOSET. PROVIDE 120V 15A RECEPTACLE ADJACENT TO (FPD) FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
11	PORTABLE INTERACTIVE VIEWBOARD ON CART. PROVIDED AND CONFIGURED BY AV CONTRACTOR.
12	FLAT PANEL DISPLAY (DIGITAL SIGNAGE), MOUNT 2 GANG BOX @ 72" A.F.F. IN WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO NEAREST IT/COMM CLOSET. PROVIDE 120V 15A RECEPTACLE ADJACENT TO (FPD) FOR DISPLAY POWER. BOX, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.
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16	AV WALL REMOTE, MOUNT 2 GANG BOX @ 18" A.F.F. (AV) AND 2 GANG BOX @ 48" A.F.F. (RM) IN WALL WHERE SHOWN. CONNECT (RM) TO (AV) WITH 1" CONDUIT. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH FROM (RM) TO NEAREST (FPD). BOXES AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. AV DEVICES PROVIDED AND INSTALLED BY AV CONTRACTOR.
17	ROUTE 1" CONDUIT TO ADJACENT (FPD).

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No	Description	Date
1	Revision 1	11/02/2022

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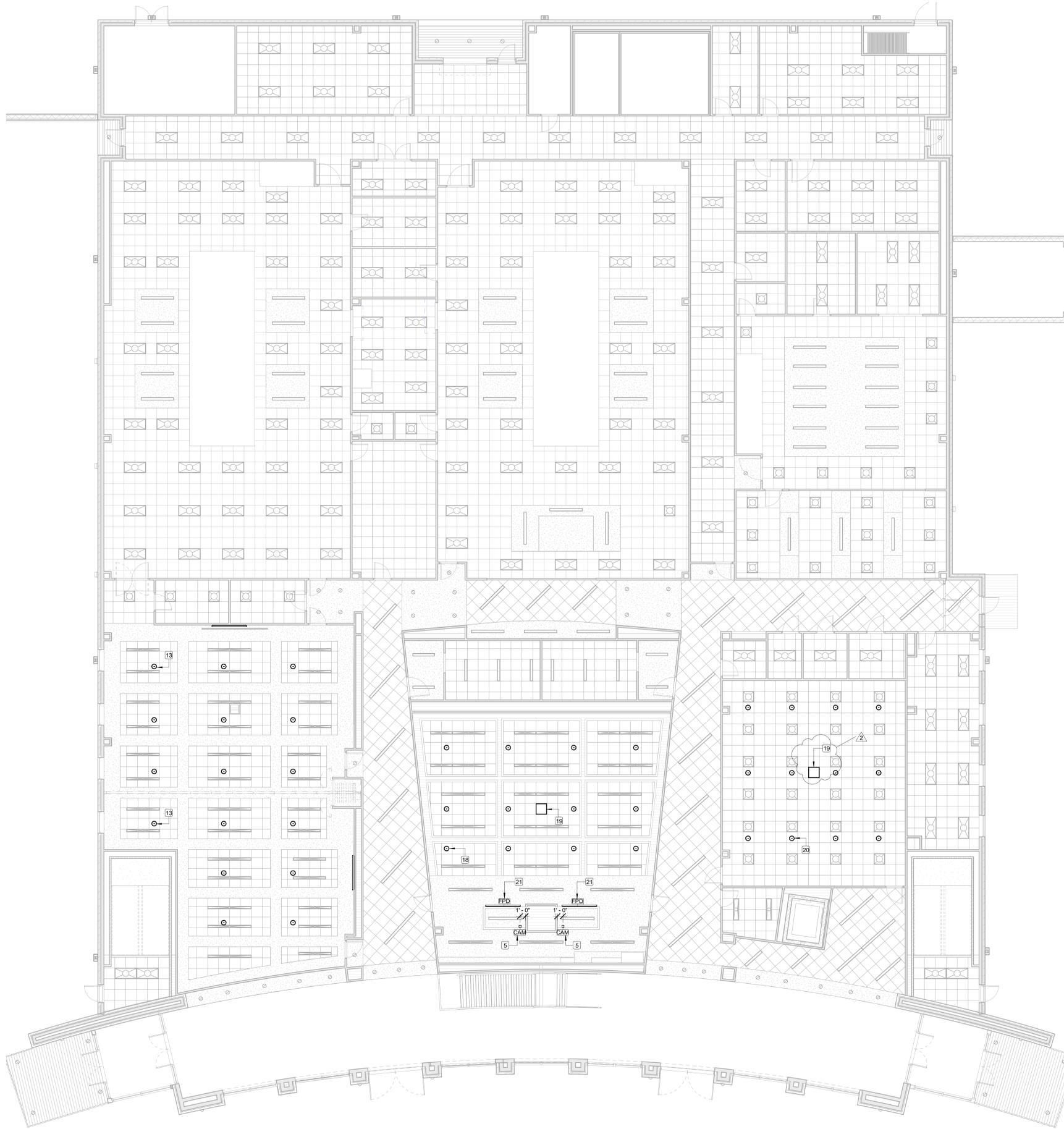
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**AV200**  
AV 2ND FLOOR PLAN

Drawn By	Checked By	Date
Author		11/11/2022

Scale: 1/8" = 1'-0"  
Project Number: 16014.00

**1 AV 2ND FLOOR PLAN**  
SCALE: 1/8" = 1'-0"



AV Keynote Legend	
Key Value	Keynote Text
5	CAMERA J-BOX. MOUNT 2 GANG BOX IN CEILING 12" ADJACENT TO HOOD. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO JAVI BOX BEHIND AV EQUIPMENT RACK. BOX AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. PTZ CAMERA AND CEILING MOUNTING DEVICE PROVIDED AND INSTALLED BY AV CONTRACTOR.
13	CEILING LOUDSPEAKER. ROUTE 1" CONDUIT FROM ABOVE ACT CEILING TO AV EQUIPMENT RACK IN A41 AV COMM ROOM. AV CONTRACTOR TO CONNECT ADJACENT LOUDSPEAKERS WITH PLENUM RATED 16AWG CABLE. CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. LOUDSPEAKERS PROVIDED AND INSTALLED BY AV CONTRACTOR.
18	CEILING LOUDSPEAKER. ROUTE 1" CONDUIT FROM ABOVE ACT CEILING TO JAVI BEHIND AV EQUIPMENT RACK IN THIS SPACE. AV CONTRACTOR TO CONNECT ADJACENT LOUDSPEAKERS WITH PLENUM RATED 16AWG CABLE. CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. LOUDSPEAKERS PROVIDED AND INSTALLED BY AV CONTRACTOR.
19	DIGITAL CEILING MICROPHONE IN ACT CEILINGS.
20	CEILING LOUDSPEAKER. ROUTE 1" CONDUIT FROM ABOVE ACT CEILING TO FPDJ IN THIS SPACE. AV CONTRACTOR TO CONNECT ADJACENT LOUDSPEAKERS WITH PLENUM RATED 16AWG CABLE. CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. LOUDSPEAKERS PROVIDED AND INSTALLED BY AV CONTRACTOR.
21	FLAT PANEL DISPLAY. MOUNT 2 GANG BOX IN FACE OF SOFFIT WALL WHERE SHOWN. PROVIDE 1" CONDUIT STUB UP AND CLEAR CABLE PATH TO JAVI BOX BEHIND AV EQUIPMENT RACK. PROVIDE 120V 15A RECEPTACLE ADJACENT TO FPDJ FOR DISPLAY POWER. BOXES, POWER AND CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. DISPLAY AND WALL MOUNT PROVIDED AND INSTALLED BY AV CONTRACTOR. GC TO PROVIDE IN-WALL BLOCKING IN COORDINATION WITH AV CONTRACTOR.

1 AV 1ST FLOOR RCP  
SCALE: 1/8" = 1'-0"

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No	Description	Date
1	Revision 1	11/02/2022

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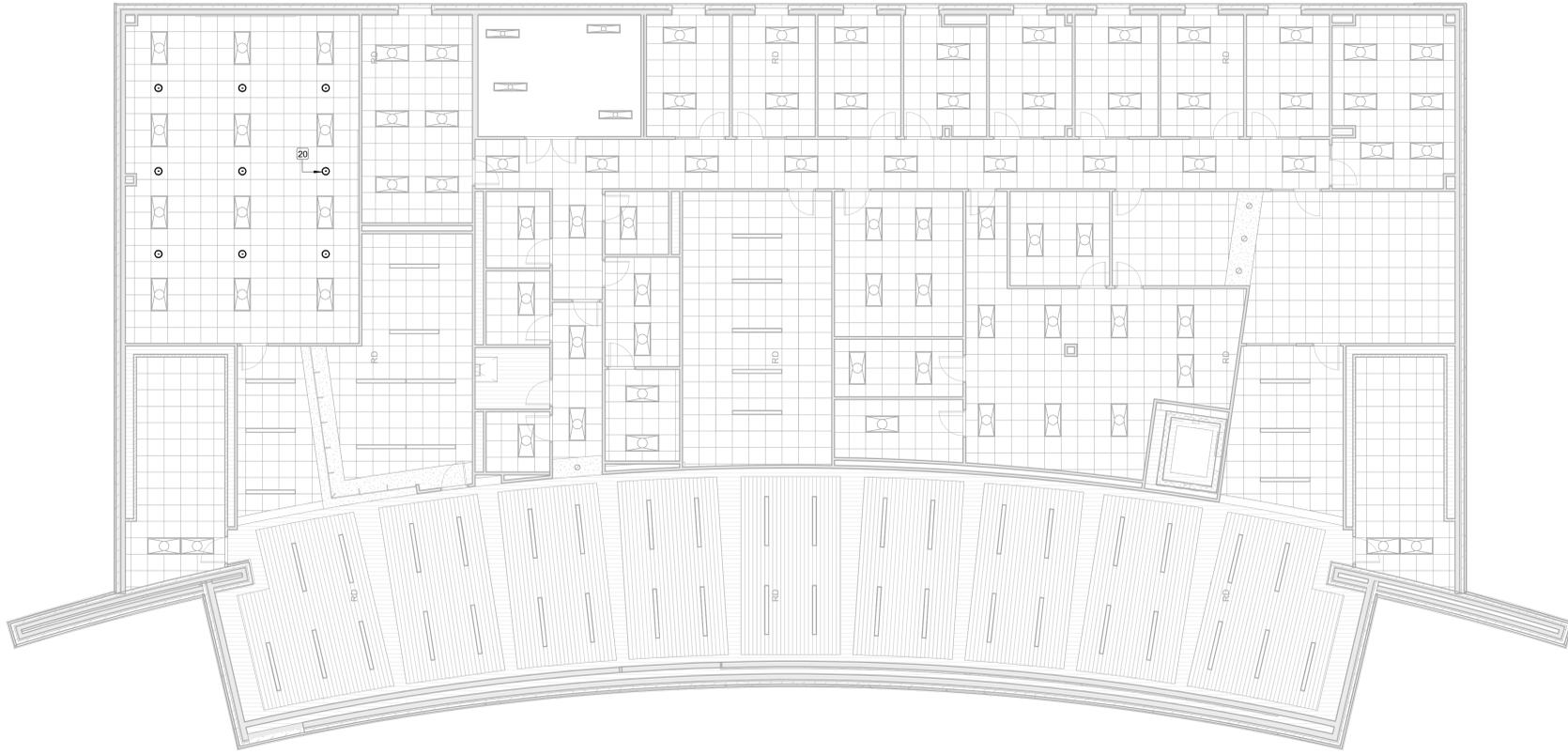


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**AV300**  
AV 1ST FLOOR RCP

Drawn By	Checked By	Date
Author		11/11/2022

Scale: 1/8" = 1'-0" Project Number: 16014.00



1 AV 2ND FLOOR RCP  
SCALE: 1/8" = 1'-0"

AV Keynote Legend	
Key Value	Keynote Text
20	CEILING LOUDSPEAKER. ROUTE 1" CONDUIT FROM ABOVE ACT CEILING TO (FPD) IN THIS SPACE. AV CONTRACTOR TO CONNECT ADJACENT LOUDSPEAKERS WITH PLENUM RATED 16AWG CABLE. CONDUIT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. LOUDSPEAKERS PROVIDED AND INSTALLED BY AV CONTRACTOR.



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Revisions		
No.	Description	Date

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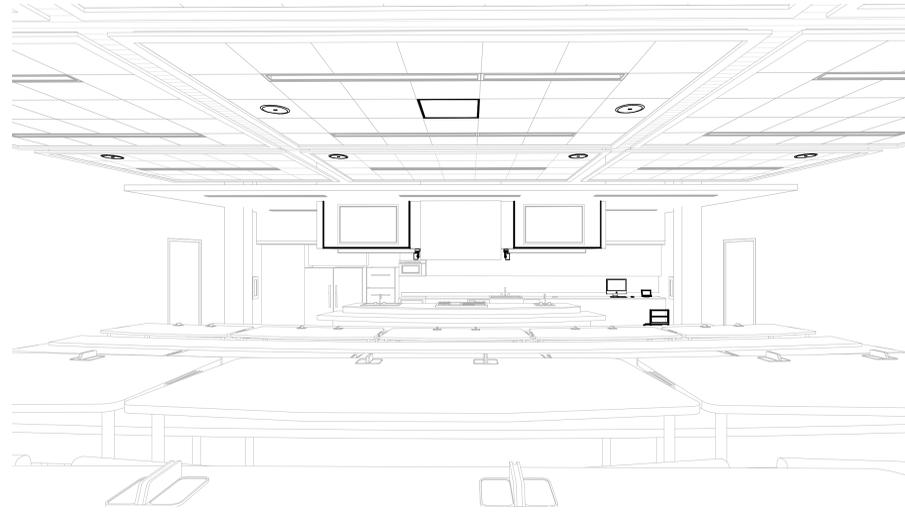


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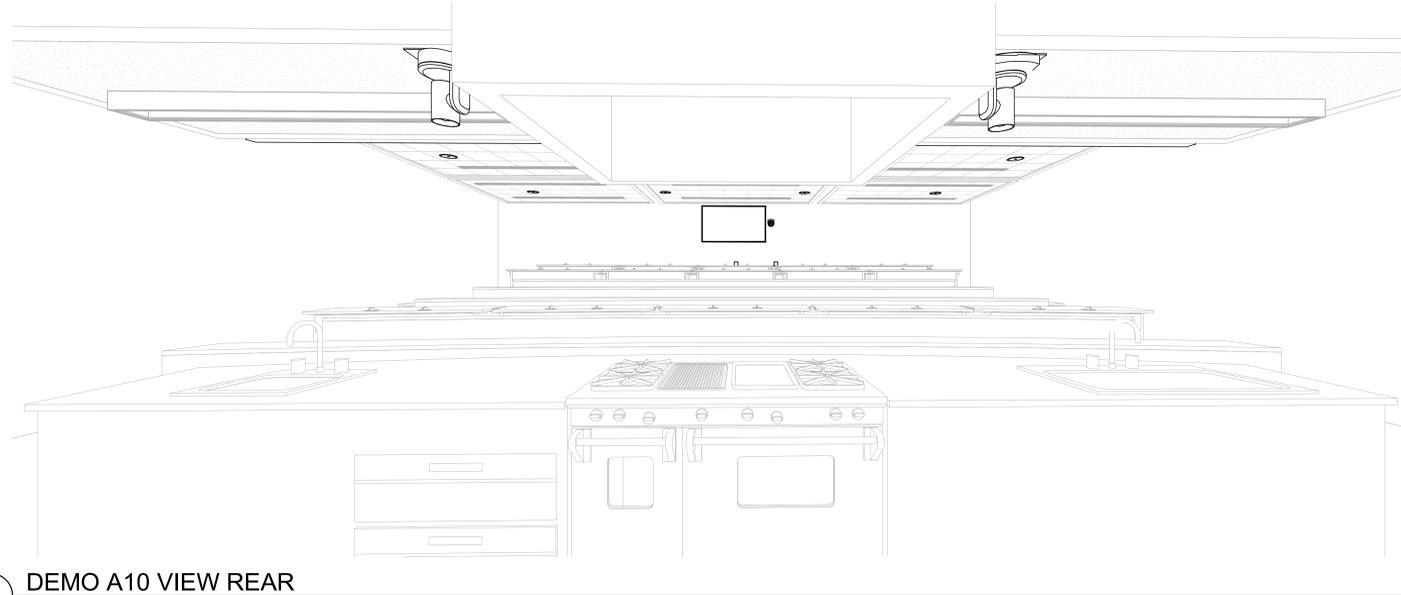
**AV400**  
AV 2ND FLOOR RCP

Drawn By	Checked By	Date
Author		11/11/2022

Scale	Project Number
1/8" = 1'-0"	16014.00



1 DEMO A10 VIEW FRONT  
SCALE:



2 DEMO A10 VIEW REAR  
SCALE:



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**Preplanning**

Revisions		
No.	Description	Date

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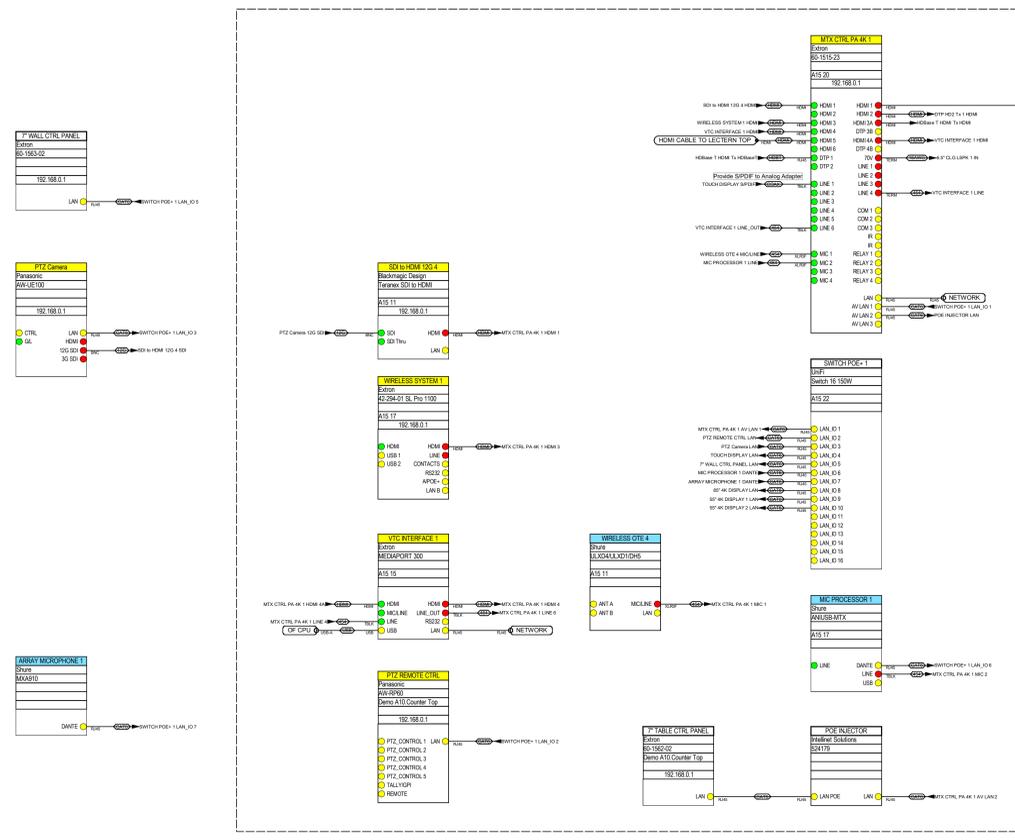
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**AV500**  
AV ELEVATIONS

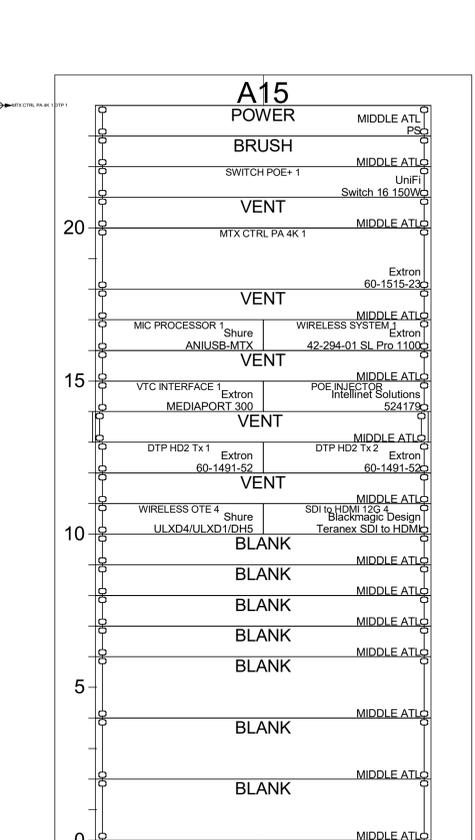
Drawn By	Checked By	Date
		11/11/2022

Scale	Project Number
	16014.00

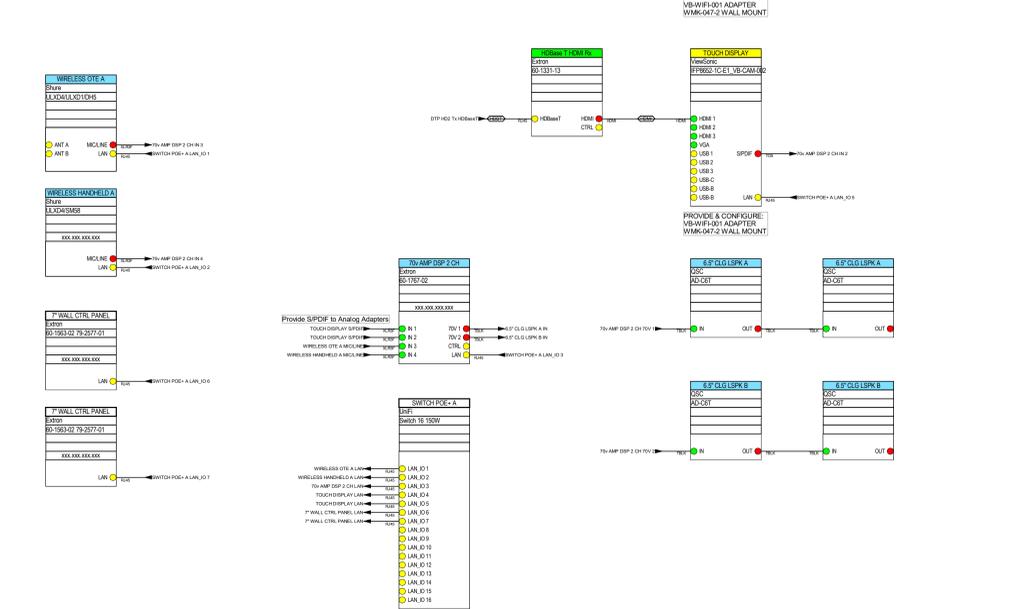
2 CLASSROOM A15 AV SYSTEM  
SCALE: 12" = 1'-0"



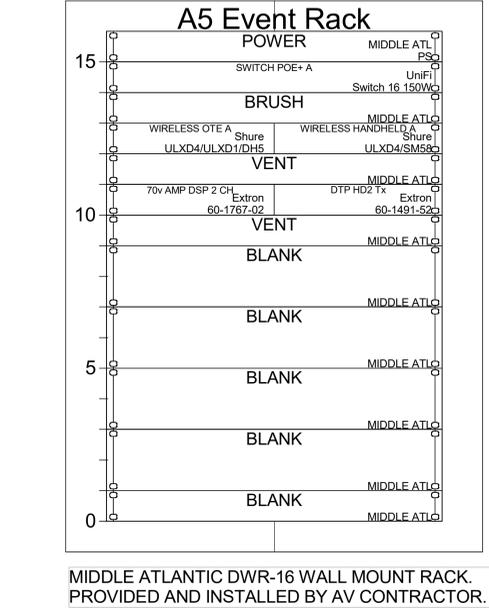
6 CLASSROOM A15 - AV RACK  
SCALE: 3" = 1'-0"



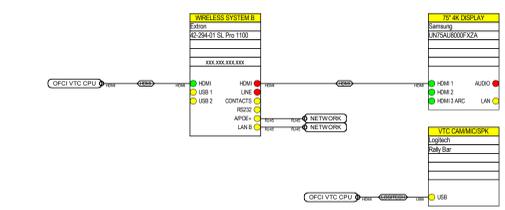
1 CLASSROOM A5 / EVENT AV SYSTEM  
SCALE: 12" = 1'-0"



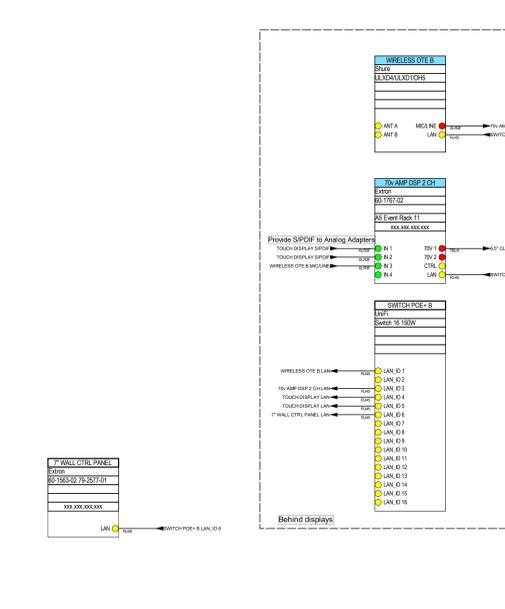
5 A5 EVENT AV RACK  
SCALE: 3" = 1'-0"



4 CONFERENCE B16 AV SYSTEM  
SCALE: 12" = 1'-0"



3 CLASSROOM B4 AV SYSTEM  
SCALE: 12" = 1'-0"



Revisions table with columns: No, Description, Date

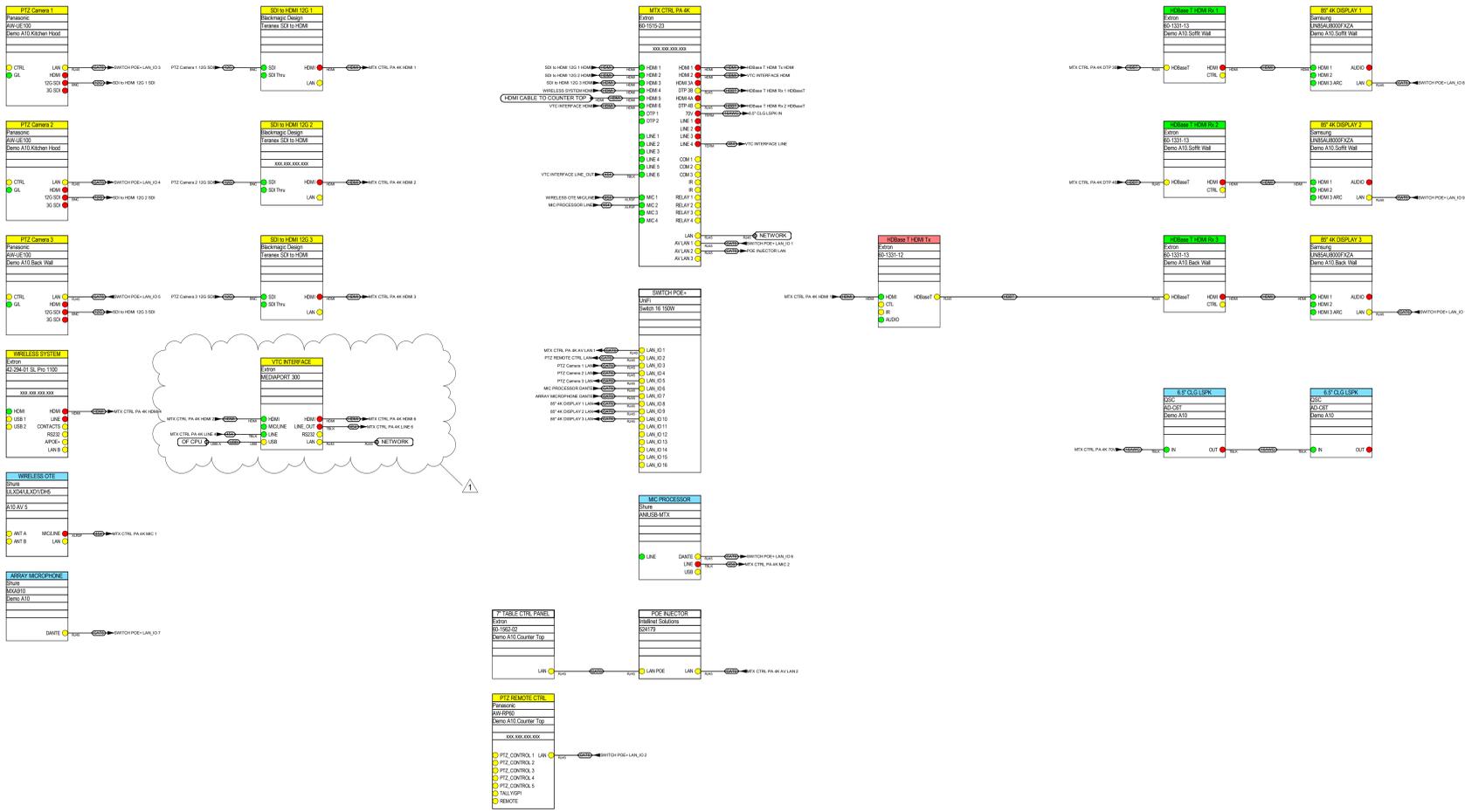
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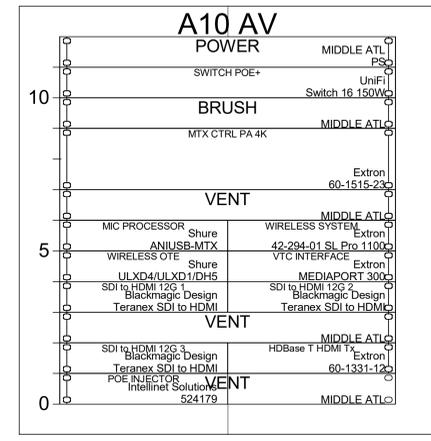
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AV600  
AV SYSTEM SCHEMATIC - PART 1

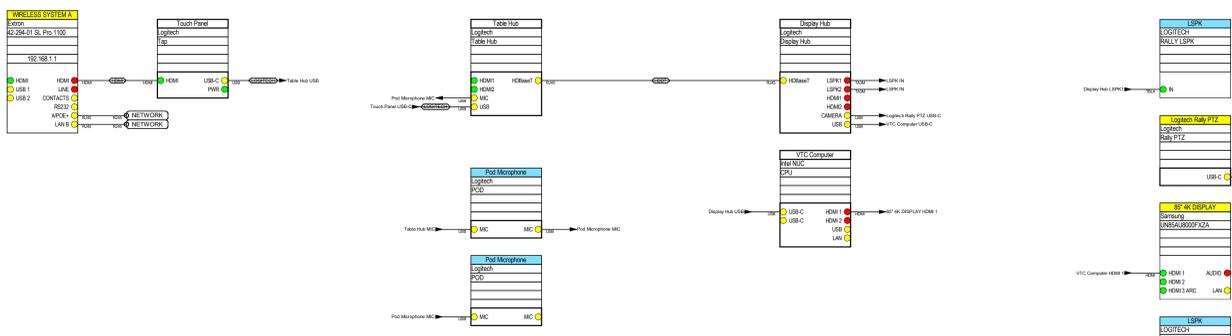
Project information table with columns: Drawn By, Checked By, Date, Author, Project Number



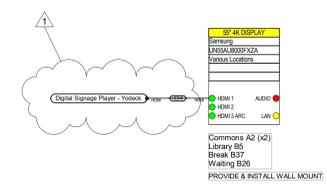
1 DEMO A10 AV SYSTEM  
SCALE: 12" = 1'-0"



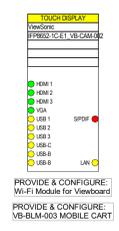
2 DEMO A10 AV RACK  
SCALE: 3" = 1'-0"



3 DINING A39 / CONFERENCE B15 AV SYSTEM  
SCALE: 12" = 1'-0"



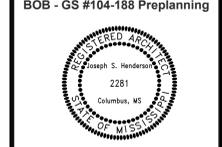
4 DIGITAL SIGNAGE  
SCALE: 12" = 1'-0"



5 PREP 1, 2, BAKING PORTABLE  
SCALE: 12" = 1'-0"

Revisions		
No.	Description	Date
1	Revision 3	12/09/2022

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**AV601**  
AV SYSTEM SCHEMATIC - PART 2

Drawn By	Checked By	Date
Author	11/11/2022	
Scale	Project Number	
As Indicated	16014.00	

## AUDIO – VISUAL SYSTEMS

### PART 1 GENERAL

#### 1. RELATED SECTIONS

- (A) The Drawings, General, Special and Supplementary Conditions of the Contract to the Work of this Section.
- (B) All project construction documents correspond to this Section.
- (C) The Specification Sections of other disciplines correspond to this Section, insofar as contractor coordination and the requirements for interconnection with the work of other contractors are required, and insofar as they apply.
- (D) Division 16000 – Electrical Systems

#### 2. SYSTEM DESCRIPTION

- (A) Audio Reinforcement System consists of loudspeakers, digital audio processing, digital AV conferencing system, equipment cabinet, cabling, rigging materials, and wiring.
- (B) The Video Reinforcement & distribution system consists of HDBaseT transmitters and receivers, switcher/scaler, touch panels, controllers, displays, cabling and connectors.
- (C) Integration of any owner furnished equipment (OFE), furnishing and installation of specified products, as well as incidental equipment, hardware and cabling required providing complete and fully functional systems. Furnish, deliver, erect, and connect all the material and equipment described herein and in the drawings, and also all other incidental material and tools, transportation, etc. required to make work complete, in accordance with these plans and specifications, as required to leave the system in first class operating condition, excluding those items designated WORK BY OTHERS (WBO) or NOT IN CONTRACT (NIC).
- (D) Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these specifications, manufacturers' recommendations and all applicable code requirements.
- (E) The AV systems include the following major items:
  - a) Digital audio & video signal processors, digital control processor and touch panels.
  - b) Loudspeakers and loudspeaker mounting or support hardware
  - c) Video processor, displays and support & hardware
  - d) Equipment Racks, Cabinetry, and Furniture
  - e) Cables, Connectors, Plates, and Wiring
  - f) Preparation of submittal information
  - g) Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements
  - h) Specific control system programming, training & support
  - i) Initial tests and adjustments, demonstration for approval, final adjustments and documentation

- j) Instruction of operating personnel; provision of manuals
  - k) Maintenance services; warranty
- (F) Provision of system testing, system documentation and instruction of Owner Personnel.
- (G) Guarantees and Warranties.

#### 1. REFERENCES

In addition to the references in Division 1, all requirements of the latest published edition, unless otherwise noted, including but not limited to the following, shall apply. In the event of conflict between cited or referenced standards, the more stringent shall govern.

- a) National Electric Code (N.E.C).
- b) Federal Communications Commission (F.C.C.) Rules and Regulations, Part 76.
- c) Society of Cable Television Engineers (S.C.T.E.)
- d) Society of Motion Picture and Television Engineers (S M P.T.E.)
- e) American Society for Testing Materials (A.S.T.M.)
- f) National Cable Television Association (N.C. T. A.)
- g) Electronic Industries Association (E.I.A)
- h) Telecommunications Industries Association (T. I.A.)
- i) "Handbook for Riggers", 1977 Revised Edition, Newberry, W. G., Calgary, Alberta Canada.
- j) "Basic Principles for Suspended Loudspeaker Systems", Technical Notes Volume 1, Number 14, JBL Professional.
- k) Davis, Don and Carolyn, Audio system Engineering, Second Edition, Howard W. Sams and Co., Indianapolis, Indiana, 1986.
- l) DOE Standard DOE-STD-1090-99 Hoisting and Rigging

#### 4. SUBMITTALS

- (A) Provide shop drawings and record drawings using the following scales:
- a) Details – not less than 1/4"=1'-0"
  - b) Plans – not less than 1/8"=1'-0"
- (B) Mark all submittal documents to show the project name, date, Architect, Contractor, Sub-Contractor, and this specification Section number.
- (C) Make each specified submittal as a coordinated package complete with all information. Uncoordinated sets will be returned without review.
- (D) Cable and Connector Submittal: Submit sample cable with connections and wire labels. Cable sample should be 18" in length. Submit cable/connector assemblies for each type of cable to be used on the project. Manufacturer's cable jacket ID lettering must be included on the sample cable.
- (E) Product Data: Submit manufacturer's product data sheets for each item of equipment that will be provided as part of this contract. Provide a complete list of proposed equipment broken down by system. Provide a budget summary page listing price by system. Binders shall be 3-

ring binders sized to handle materials plus 34% excess. All cut sheets shall be arranged by system type and then by specification number with tabbed dividers between sections. A table of contents shall appear at the front of the binder.

- (F) Submit heat load calculations showing how loads were derived if requested by Owner or Owners Representative.
- (G) Custom Software Programming including Graphical User Interface (as required). Provide for approval at least three (3) weeks prior to system commissioning, electronic copies of all custom software. It is the Contractor's responsibility for all custom software programming for the systems they are controlling. Coordination with the Consultant is required for the development of this software.
- (H) Provide Panel Fabrication Details including panel engraving schedule to Owner and Consultant prior to ordering panels.
- (I) Any technical questions in regards to the proposal/systems shall be submitted in written form to the AV Consultants:

Chris Nix  
Chris.Nix@its.ms.gov

## 5. QUALIFICATIONS

- (A) Bidder shall be an A/V systems contractor, normally engaged in the full time business of A/V systems installation. Show proof that bidder has been in the communications system installation business for a period of no less than five years and has completed projects of similar size and scope. The Owner and/or Owner's representative reserves the right to reject any bids submitted by firms without sufficient experience in projects of this size, complexity, or any other terms the owner or owner's representative may deem relevant.
- (B) No sub-contractor or contract employees will be permitted to perform the contractor's responsibilities as defined herein, unless specifically identified in the bid submission and approved by the Owner and/or Owner's representative. The contractor shall have sole responsibility for the satisfactory execution of the work, even though he may have sub-contracted a portion of the work, or had certain manufacturers install their own products.

## 6. QUALITY ASSURANCE

- (A) Review architectural, civil, structural, mechanical, electrical, and other project documents relative to this work.
- (B) Verify all dimensions on the site.
- (C) Coordinate the specified work with all other trades.
- (D) Provide all items not indicated on the drawings or mentioned in the specifications that are necessary, required or appropriate for this work to realize complete, stable and safe operation.
- (E) Review project documentation and continuously make known any conflicts discovered and provide all items necessary to complete this work to the satisfaction of the Owner and/or Owner's representative without additional expense. In all cases where a device or item or equipment is referred to in singular number or without quantity, each such reference shall apply to as many such devices or items as are required to complete the work.
- (F) Provide additional support or positioning members as required for the proper installation and

operation of equipment, materials and devices provided as part of this work as approved by the Owner and/or Owner's representative, without additional expense.

- (G) Regularly examine all construction, and the work of others, which may affect the work to ensure proper conditions for the equipment and devices before their manufacture, fabrication or installation. Contractor shall be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.
- (H) Promptly notify the Owner and/or Owner's representative of any difficulties that may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable in all ways to receive this work, except for defects that may develop in the work of others after its execution.
- (I) The Systems Contractor shall maintain the same Project Coordinator (Manager) and Field Supervisor throughout the entire project. The Systems Contractor shall provide contact information to the client, AV Consultant, General Contractor and Electrical Contractor, for both parties prior to commencing on-site project work.
- (J) Source Limitations: Obtain as many products as possible from a single manufacturer. Obtain each item as a completely newly manufactured unit, including necessary mounting hardware, manuals and accessories.

## 7. OWNER'S RIGHT TO USE EQUIPMENT

- (A) The Owner reserves the right to use equipment, material and services provided as part of this work prior to final acceptance without incurring any obligation to:
  - a) Accept material and equipment or completed systems until all punch list work is completed and all systems are acceptable.
  - b) Pay additional cost or charge.
  - c) Commence the warranty period for any system or device provided as part of the work.

## 8. PERMITS AND INSPECTIONS

- (A) Obtain all required permits and inspections.
- (B) Furnish material and workmanship for this work in conformance with all code requirements
- (C) Perform all tests required herein, or as may be reasonably required to demonstrate conformance with the specifications.

## 9. DELIVERY, STORAGE, AND HANDLING

- (A) Store equipment and materials safely and securely inside at the job site in a manner that will not interfere with the work of other trades.
- (B) Replace all damaged or defective work or material at no additional cost, prior to acceptance.
- (C) Check, and if necessary, clean all systems, equipment, devices and components included in the work after acceptance and completion of the work of all other trades.
- (D) Store materials in designated areas.

- (E) Provide and maintain suitable barriers, guards, fences and signs wherever necessary for the safety of others relative to and/ or for the protection of this work.
- (F) Protect all materials and equipment to prevent the entry or adhesion of concrete, plaster, unintended paint, or other damaging debris or materials.

#### 10. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- (A) Submit shop drawings, product data and samples together in one package within thirty (30) days after award of the Contract and prior to ordering equipment.
- (B) Submit catalog data sheets, neatly bound with title page, space for submittal stamps, and tabbed dividers between Sections. Provide a complete list of proposed equipment. Provide a summary of pricing broken down by system. Denote all substitutions.
- (C) Submit rack layouts indicating the proposed arrangement of mounted equipment including junction boxes and locations of conduit penetrations.
- (D) Submit construction details of all custom fabricated items and approved equipment modifications. Include complete parts lists, schematic diagrams, and all dimensions required for proper assembly.
- (E) Submit finish schedule indicating proposed color selections and finishes for custom fabricated items, wall plates and custom labels.
- (F) Submit mounting and support details for all items mounted overhead, including loudspeakers complete with parts lists and dimensions. Include a full plan view, front elevation and side elevation of each unique item with corresponding support structure and mounting hardware.
- (G) Approval of shop drawings or submittal indicates only the acceptance of the manufacturer and quality. Specific requirements, arrangements, and quantities still must comply with the intent of the contract documents as interpreted by the Owner and/or Owner's representative unless specifically approved in writing.
- (H) Submittals, which are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors, will be returned without review for rework.

#### 11. PROJECT RECORD DRAWINGS (As Built Drawings)

- (A) Approved shop drawings, updated to accurately document the final conditions of the system installation. Legibly mark to record actual construction:
  - a) Field changes of dimension and detail.
  - b) Changes made by Revision Order, Directive or other modifications.
  - c) Details not in original contract drawings.
  - d) Any other miscellaneous items installed under this contract. At a minimum, the ends of each line should have the type of termination, coordinate and elevation indicated.
  - e) Layouts of system devices showing actual device locations.
  - f) Results of all Field Quality Control Tests in this Section.

#### 12. OPERATION MANUALS

- (A) Operation manuals shall include, but not limited to the following sections:
  - a) Table of Contents.

- b) Typed description of system including key features and operational concepts (e.g. remote control features, switching functions, and mixing capabilities).
- c) Setup diagrams and typed instructions for use in typical situations as directed by the Owner.
- d) Small scale plans showing locations and circuit numbers for all system outlets and receptacles.
- e) Single-line block diagrams showing all major components of the systems.
- f) Manufacturer's operation manuals for user-operated equipment (tape decks, processors, communication equipment, etc.).

### 13. MAINTENANCE MANUALS

- (A) Provide the owner any maintenance manuals that come packaged with equipment.

### 14. PROJECT CONDITIONS

- (A) If project conditions indicate a need to vary from the Specifications or Drawings, notify the Owner and/or Owner's representative, make recommendations, and proceed with the necessary changes only after receipt of approval from the Owner and/or Owner's representative.
- (B) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

### 15. WARRANTY

- (A) Provide a one (1) year System Warranty, and the following, at no additional cost to the Owner.
- (B) Warranty shall contain the following:
  - a) Date, project title and number.
  - b) Contractor's name, address, telephone number and point of contact.
  - c) Title and number of each as-built document.
  - d) Signature of contractor, or its authorized representative.
  - e) Include the name of a contact person for service or maintenance and define the limits of the system warranty.
- (C) During the System Warranty period, answer all service calls and requests for information within twenty-four (24) hours. Repair or replace faulty items and correct faulty workmanship on site within twenty-four (24) hours of all service calls.
- (D) Conduct all warranty repairs and service at the job site unless in violation of manufacturer's warranty. In the latter event, provide substitute systems, equipment, and/or devices, acceptance to the Owner, for the duration of such off site repairs. Transport warranty materials, parts, and personnel to and from the job site at no additional cost.
- (E) For products with manufacturer's warranties lasting more than one (1) year, register warranties in the Owner's name.

### 16. SUBSTITUTIONS

- (A) Denote any substitutions for consideration by the Owner or Owner's representative.

18. BRAND NAMES AND ACCEPTABLE ALTERNATIVES

- (B) The brand name(s) and model number(s) mentioned are used in this specification as a measure of quality and performance. Any brand or manufacture of acceptable or better quality and performance than that specified will be considered for acceptance by the Owner and/or Owner's representative at time of Bid. However, the Owner and/or Owner's representative reserves the right to reject and deny any substitution that it may, in its sole discretion, deem unequal, and the findings in this regard shall be accepted by the bidder as final and binding.

19. OWNER FURNISHED EQUIPMENT (O.F.E.)

- (A) Certain equipment may be identified as Owner Furnished (OFE or Existing). This Owner Furnished Equipment may presently be part of the Owner's system, or will be provided by the Owner, and will be delivered to the contractor's off-site construction facility, delivered to the contractor's on-site secured storage area, or installed on site by others, as appropriate, for incorporation into the system.
- (B) Clean and inspect the OFE, and notify the Owner and/or Owner's representative of damage or defect and the extent of repair and/or adjustment required to bring the OFE to original specification. Service OFE only if directed by the Owner and/or Owner's representative under the arrangements of a separate contract.
- (C) Connect, terminate and properly incorporate OFE into the proper system for its type. Reconnect any equipment disconnected for installation of new equipment. Verify proper operation and control functions as before removal.

20. INSURANCE

- (A) Insure materials against theft, vandalism, damage due to the elements, fire, etc., to their full value. Materials and the flawless condition of materials shall remain the responsibility of the contractor until acceptance of the system by the Owner.
- (B) Contractor shall be responsible for having in force the following insurance protection, this protection shall also be required for any subcontractors the Contractor may hire. Certificates of insurance shall be provided within five (5) calendar days upon request.
  - a) Workers Compensation Coverage for all workers
  - b) General, Automobile and Excess or Umbrella Liability Coverage
  - c) General Liability Coverage – Occurrence Form Required
  - d) Business Automobile Liability Coverage

21. WORK BY OTHERS (WBO, BY OTHERS) NOT IN CONTRACT (NIC)

- (A) As noted on drawings and in project documentation

## PART 2 PRODUCTS

### 1. GENERAL

- (A) All equipment and materials shall be new, latest version at time of bid, and shall conform to applicable UL, CSA, or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner and/or Owner's representative. Evidence of unauthorized re-manufactured, or "B" stock equipment on the project site will be deemed evidence of the contractor's Failure to Perform the Work. Take care during installation to prevent scratches, dents, chips or disfiguration.
- (B) Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required.
- (C) Asbestos Prohibition: No Asbestos containing materials shall be used under this section. The contractor shall insure that all materials incorporated in the project are Asbestos free unless specifically authorized in writing by the Owner and/or Owner's representative.
- (D) All products listed below are listed for sole source information and establishment of the level of quality required by this project. Refer to the project drawings to establish quantities.
- (E) Install all rack mounted equipment with black steel 10-32, button head machine screws with plastic cup washers protecting equipment panel. Do not over torque, round out, strip or mar screws.
- (F) Provide and install an escutcheon ring around all pipes, poles and mounts that penetrate the ceiling. Color to be determined by owner.
- (G) Some rack-mounted equipment may require shaft locks, covers, or removal of knobs; provide and install during Acceptance Testing
- (H) Provide plastic permanent approved labels at the front and rear of all rack-mounted power amplification and signal processing equipment. Mount labels on the equipment rack or equipment chassis, and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Label equipment with schematic enumeration reference, and with descriptive information regarding its function or area it is serving. Similarly, provide permanent approved labels at the rear only of equipment mounted in furniture consoles.
- (I) All engraving shall be 1/8" block lettering unless noted otherwise. On dark panels or pushbuttons, letters shall be white. Letters shall be black on stainless steel, brushed natural aluminum plates or light-colored push buttons.
- (J) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.
- (K) Per IEC-268 standard, all XLR connectors not mounted on equipment shall be wired pin 2 hot (high), pin 3 (low), and pin 1 screen (shield).

### 2. AUDIO SYSTEMS MATERIALS

- (A) The materials or description of work in this section is typical for all systems in this section and all following specification sections.
- (B) All equipment items required to provide a fully functional system may not be noted or depicted on the schematic diagrams. Confirm your quote includes all required equipment documented in the system drawings and any required equipment not listed or shown. Report any missing or required equipment to the Consultant prior to submitting your quote.
- (C) Mounting Hardware exposed to the weather shall be aluminum, brass, and epoxy painted galvanized steel, or stainless steel. Apply corrosion inhibitor to all threaded fittings. AV Contractor

can sub the control system programming, training and support from a certified programmer/company.

(D) AUDIO-VISUAL SYSTEM

Reference AV drawings for make, model and quantity of AV components. Notify AV Consultant of any discrepancies prior to submitting bids or shop drawings. Failure to notify does not constitute change order (add) approval.

Verify with system drawings, on-site inspection and requirements to provide a fully functional system(s).

Provide all materials, labor, training and miscellaneous equipment as required.

Provide all display mounting devices; wall, ceiling, truss, etc. as shown or required.

Provide all industry standard patch bays, fiber trays, patch cords and fiber link cables as shown or required.

Provide all required network, audio, video, POE, POE+ and control cables as shown or required.

Provide all digital system programming and/or GUI control design.

Provide manufacturer support, on-site commissioning & training for AV systems as/if required.

3. CABLES AND CONTROL WIRING

- (A) All electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper and shall be Anaconda, Triangle, General or approved equal for power, and Alpha, Belden, or West Penn for low voltage. Cables in plenum rated ceilings outside conduit shall be similar to those listed above, except plenum rated.
- (B) Homerun ALL Loudspeaker Cables, Reinforcement Loudspeaker Cables, Monitor and Fold-back Loudspeaker Cables. Cables between loudspeakers interconnect junction boxes and racks to be at least No. 12 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.
- (C) Other Loudspeaker Cables to be at least No. 16 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.
- (D) Line Level and Microphone Level Cables to be at least No. 22 AWG shielded jacketed pair equal to West Penn CL3-452 or CL3-291 or as shown on the AV drawings. Multi-conductor High Resolution Video Cable shall be manufactured by Extron Electronics or West Penn CDT.
- (E) Coaxial Cable for video and RF transport shall be RG-6 quad-shielded with a solid copper center conductor. Any other cable if installed shall be removed and replaced with approved cable at no additional expense to the owner.
- (F) Low Voltage Control Cabling to be at least No.18AWG shielded CL3 rated cable, conductor count to be determined by application.
- (G) All cables that are not in conduit and are run through plenum rated spaces shall be plenum rated cable of the gauge and conductor count required for the application.

4. FABRICATION

(A) Equipment Racks

- a) Pre-assemble and test all racks before delivery to the job site, provide a written report on pre-assembly and test results to Owner/Owner's Representative.
- b) Verify the depth of each rack prior to assembly to ensure that mounted equipment will fit completely inside with the front and rear door closed.

5. SOURCE QUALITY CONTROL TESTS

(A) Use the following test equipment meeting the following minimum specifications to perform the Source Quality Control Tests and Field Quality Control Tests. Furnish the same test equipment for the performance of Acceptance Testing.

a) Digital Multimeter

- DC to 20 kHz bandwidth
- 300 V range, 100 mV resolution
- 10 megohms input impedance
- Direct reading of dBm across 600-ohm load
- DC resistance to .1 ohm
- Dual Trace Oscilloscope (*if required or requested*)
- 100 MHz bandwidth
- 1 mV/CM sensitivity
- Dual time base capability

b) Sine/Square Wave Generator

- 5 Hz to 5 kHz bandwidth
- Output level of 0 dBm with less than .5% THD

c) Impedance Bridge

- Range: 1 ohm to 1 megohm
- Three test frequencies, minimum, ranging from 250 Hz to 4 kHz

d) Sound Level Meter

- ANSI Type 2 with one-octave filter set

(B) Measurements

- a) Measure and record impedances curves for each loudspeaker line entering rack at 1000 Hz.
- b) Grounding System tests as described in the Technical Systems Specification.

8. MISCELLANEOUS CONNECTORS

(A) Certain connectors not identified in specific paragraphs, or indicated on the drawings, are specified by generic "type". At all times, match connector types used in adjacent project areas, including existing audio, television and audiovisual systems.

- a) D(\*)F - Switchcraft D(\*)F or Neutrik NC(\*)F

- b) D(\*)M - Switchcraft D(\*)M or Neutrik NC(\*)MP
- c) TRS-F - Switchcraft 121
- d) TRS-M - Switchcraft 280 or Neutrik NP3C-BAG
- e) TRS-FJ - Switchcraft 14B or Neutrik NJ3FP6C-BAG
- f) S4FC - Neutrik NL4FC
- g) S4MP - Neutrik NL4MP
- h) BNC - Canare BCJ-R
- i) BNCL - Canare BCP-S4
- j) BNC-R - Canare BCJ-RU

### **PART 3 EXECUTION**

#### **1. INSTALLATION**

- (A) Verify existing conditions before starting work.
- (B) Execute all work in accordance with Part 1.3 References in this guideline, and with all local and state codes, ordinances, and regulations.
- (C) Install equipment according to manufacturer's recommendations.
- (D) Install all rack-mounted equipment with black steel 10-32, button head machine screws, using plastic cup washers to protect equipment panel.
- (E) Rack mounted equipment shall be mounted into racks and fully wired and tested, before delivery to job site. *(Does not apply when racks are existing)*
- (F) Install flat black blank panels in all unused rack positions. Use no larger than a two space panel.
- (G) Ensure that levels and impedances are properly matched between components.
- (H) Choose colors and finishes of all exposed and custom fabricated items and labels to blend in with the surroundings as approved by the Owner and/or Owner's representative.
- (I) Firmly and permanently attach electrical boxes, enclosures and permanent equipment to the building. Rigidly mounted equipment and devices shall be level, plumb and square.
  - a) Set "flush-mounted" units so that the face of the cover, bezel, or escutcheon is in the same plane as the surrounding finished surface.
  - b) Mount boxes, panels and trim so that there are no gaps, cracks, or obvious lines between the trim and the adjacent finished surface, and ready them to receive final finish, as applicable.
  - c) Provide access panels where needed to access boxes, panels and enclosures in walls or ceilings, as indicated and dimensioned on the shop drawings.
  - d) Finish panels to match the surrounding surfaces.
- (J) Supports and mounts for equipment to be installed over public areas shall be permanently attached to suitable building structure adequate to support the equipment loads with a safety factor of at least five.
- (K) Use attachment hardware with a minimum SAE Grade 5 load rating. Do not use formed eye-bolts or lag screws for support or connection of suspended equipment.
- (L) Verify capacity of mounting methods used in the work and associated liabilities. All attachments, attachment points, reinforcement requirements, and hardware selection shall be executed in accordance with the references in PART 1.

## 2. GROUNDING, SHIELDING AND ISOLATING

- (A) Mount and enclose all electrical and electronic equipment in metal enclosures, pedestals or equipment racks.
- (B) All junction boxes shall be bonded to the building safety ground.
- (C) Use EMT type conduit for all wiring outside of equipment racks except plenum rated wiring above a lay-in ceiling, and outdoor conduits and raceways, where separate insulated ground wiring shall be supplied.
- (D) Use flexible conduits and PVC fittings to provide insulated connections of the building electrical raceways to equipment racks. Mount all equipment racks at the job site in a manner that provides electrical isolation from the building structure and electrical raceways.
- (E) Electronics racks and cabinets shall be bonded to the isolated ground technical power system only. Refer to Section 16770 for coordination and test with the Electrical Contractor.
- (F) In the case where a metal equipment cabinet or rack is located on a suspended, concrete or bonded flooring system, the enclosure shall be placed on a Santoprene isolating mat with a minimum thickness of 3/32" and a Durometer of 80A,.

## 3. WIRING PRACTICES

- (A) Where specific instructions are not given, perform all wiring in strict adherence to standard broadcast and sound engineering practices in accordance with the references listed in PART 1.
- (B) Group all wiring into the following classifications by power level or signal type:
  - a) Microphone Level: less than -20 dBm.
  - b) Line Level Audio and DC Control Circuits: -20 dBm to +30 dBm.
  - c) Speaker Level: greater than +30 dBm.
  - d) AC Mains Power Circuits
- (C) Separate wiring of differing classifications by at least six (6) inches, wherever possible. Whenever lines of differing classification must come closer together than six (6) inches, cross them perpendicular to each other.
- (D) Neatly harness wires together within racks by power level classification using horizontal and vertical wiring supports as required. Rigidly support all wires within 6" of fixed connection points. Leave service loops of sufficient lengths to allow rack hinges or slides to fully extend to facilitate access to rear panel connectors from the front of each rack. Do not use self-adhesive anchor pads for support of cables.
- (E) Observe consistent polarity throughout the audio systems as follows:
  - a) Use only balanced differential inputs throughout all audio systems unless otherwise noted.
  - b) Use approved transformers where directed to reduce objectionable system noise to acceptable levels.
- (F) Exercise care in wiring to avoid damaging the cables and equipment. Use grommets around cutouts and knockouts where conduit or chase nipples are not installed. Use bushings where conduit terminal connections are exposed in or out of junction boxes.
- (G) Cut off unused wire ends approximately one-half inch (1/2") past the wire jacket. Fold them back over the jacket, and secure in place with heat-shrink tubing. In multi-conductor cables, preserve all unused conductors for future use. Failure to do so may result in replacement of cables at the contractor's expense.

- (H) Provide a minimum 6" service loop or enough cable to allow for three (3) subsequent terminations which ever is greater.
- (I) All cable jacket exposed stripped ends shall be dressed with the appropriate sized heat shrink.
- (J) All drain cables shall be protected from the jacket strip to the point of termination. Exposed bare wire is not acceptable.
- (K) Make all connections using rosin-core solder in conjunction with approved mechanical connectors unless other is specified by manufacturer. Connect microphone, control, and line level wiring through approved connectors. Connect speaker level wiring using approved terminal barrier strips. Mount all terminal devices on a non-conductive (electrically) rigid surface. Provide 10% spare terminals at each location. Label each terminal with a unique number.
- (L) Make all power amplifier output connections directly into amplifier binding posts, friction fit connectors are not acceptable. In the event the amplifier doesn't have binding posts, and has barrier strip connections, crimp and solder the appropriate fork lug to the cable and torque screws to manufacturer's specification.
- (M) All fiber optic cable splicing shall utilize the fusion splice method. The maximum allowable loss per fusion splice shall be 0.5 dB.

#### 4. LABELING

- (A) Label products in a logical, legible, and permanent manner corresponding to the Drawings. Wording, format, style, color, and arrangement of text will be subject to the Owner and/or Owner's representative's approval. Submit samples and labeling schedule for approval. Labeling will be verified at final adjustment and equalization
- (B) Label all wall plates for input, output, and control receptacles as well as connector mounting plates in all boxes using 1/8" engraved lettering filled with black or contrasting paint, as approved.
- (C) Use engraved plastic labels similar to Lamicoid, squarely and permanently attached, to label the following:
  - a) Patch panel designation strips.
  - b) Front and back of all rack mounted equipment including controls
  - c) Barrier strips, terminals, transformers, switches, relays, volume controls, and similar devices.
- (D) Label pushbutton switches with engraved lettering filled with contrasting color paint.
- (E) Label all permanently installed wires on both ends with approved permanent clip-on type or sleeve type markers. Wrap-around adhesive labels will not be accepted unless completely covered with clear heat shrink tubing.
- (F) Label all portable equipment with engraved block letters using initials and/or words. Label all portable cables similarly with printed heat-shrinkable tags located 12 inches from the male connector end. Verify lettering through the Owner and/or Owner's representative prior to engraving or printing.
- (G) Label access panels and backboards with designations corresponding to the drawings. Where devices are concealed above access ceilings, provide permanent lamicoid labels, on the ceiling supports corresponding to the drawings in finishes and sizes approved by the Owner and/or Owner's representative.

#### 5. FIELD QUALITY CONTROL TESTS

- (A) Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner

and/or Owner's representative during the entire installation.

- (B) Before connecting any equipment to AC power outlets, measure the AC voltages between hot, neutral, and ground and verify correct voltage and polarity of AC power. Equipment damaged by connecting to improperly wired outlets shall be replaced at no addition cost to the Owner.
- (C) Upon completion of the system installation, it shall be the responsibility of the contractor to perform the necessary adjustments and balancing of all signals and amplifier gain, and other level controls to ensure proper system operation. The Owner shall physically inspect the system and/or Owner's representative to assure that all equipment is installed in a neat and workmanlike manner as called for by the plans and specifications.
- (D) Determine the proper sequence of energizing systems to minimize the risk of damage.
- (E) After successfully energizing the systems, make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable.
- (F) Verify the performance parameters of the individual systems following established professional procedures, in addition to those specified herein.
- (G) Measure and record impedance curves of all loudspeaker lines at amplifier rack terminal barrier strips prior to connecting to amplifier outputs.
- (H) Apply a sine-wave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5000 Hz at a sound pressure level which is 10 dB below the loudspeaker's rated electrical input power. Listen for rattles or objectionable noise and correct if apparent.
- (I) Using a +4 dBm sine-wave input, set controls of each component to produce a +4 dBm sine-wave output. Under these conditions (unity gain), the presence of any waveform, distortion, interference signals, or oscillations shall be unacceptable.
- (J) Check for proper polarity of ceiling mounted loudspeakers by applying music program or pink noise to each system and walking through the transition areas of coverage from one loudspeaker to the next. Transition should be smooth with no apparent shifting of source from one loudspeaker to the next.
- (K) Drive each ceiling distributed loudspeaker system with one octave of pink noise centered at 1000 Hz at a sound pressure level which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide uniform distribution of sound throughout the seating areas within a tolerance of  $\pm 3$  dB. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.
- (L) Individually drive each reinforcement loudspeaker with one octave of pink noise centered at 1000 Hz at a sound pressure level, which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide an equal sound pressure level from each loudspeaker on its aiming axis in the seating area. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.
- (M) Upon completion of initial tests and adjustments, notify the Owner and/or Owner's representative the system is ready for final equalization and acceptance testing.

## 6. TEST EQUIPMENT

- (A) Provide the following test equipment on site during construction and available to the Owner and/or Owner's representative during final adjustment and acceptance testing:
  - a) Digital Multi-meter
  - b) 100 MHz Dual Trace Storage Oscilloscope
  - c) Video Test Pattern Generator (*XGA, Component, YC and Composite*)

- d) Sine/Square Wave Generator
- e) Impedance Bridge
- f) Sound Level Meter - ANSI Type 2 with one-octave filter set

#### 7. FINAL ADJUSTMENT AND EQUALIZATION

- (A) Schedule a time for the Owner and/or Owner's representative to perform the Final Adjustment and Equalization. Notify the Owner and/or Owner's representative and Consultant at least twenty one (21) days in advance.
- (B) Furnish project lead installer to assist the Owner and/or Owner's representative during the Final Adjustment and Equalization.
- (C) Audio Systems acceptance tests shall employ an approved sound level meter, and spectrum analyzer and digital multi-meter to be provided by the contractor. Measurements shall be made at the combined output of the amplifiers and at selected locations throughout the facility.
- (D) Video Systems acceptance tests shall employ an approved video test pattern generator, PC with min. XGA output and a 100MHz dual trace storage oscilloscope. Measurements shall be made at the point of signal origination and compared to signal at the display device. Minimum requirements at the display device shall be a rise time no greater than 7.5ns (5ns preferred) and amplitude of .7 volts.
- (E) Record final settings on all equipment and submit with contract closeout documents.

#### 8. CLEAN UP

- (A) Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed on a daily basis unless designated for storage.
- (B) Clean all areas around system equipment and be sure that the inside of each equipment rack is free of cut wire ends, solder splatters, and other debris.

#### 9. DEMONSTRATIONS AND TRAINING

- (A) Furnish a technician who is qualified to operate and maintain the systems specified in this Section to instruct Owner designated personnel regarding the design features and proper operation of the systems.
- (B) If requested by the Owner, furnish the same technician/instructor during the first formal use of each system to further instruct and assist Owner personnel in system operation.
- (C) Upon completion of the Work, the Owner and/or Owner's representative may elect to verify test data as part of the acceptance procedure. Provide personnel and equipment, at the convenience of the Owner and/or Owner's representative, to reasonably demonstrate system performance and to assist with such tests without additional cost to the Owner and/or Owner's representative.

#### 10. FINAL PROCEDURES

- (A) Perform any and all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Owner and/or Owner's representative, at no additional expense to the Owner and/or Owner's representative.
- (B) Furnish all portable and loose equipment to the Owner along with complete documentation of the materials presented. All portable equipment shall be presented in the original manufactur-

- ers packing, complete with all included instructions and miscellaneous manuals and documents.
- (C) Test Reports and Certificates:
- a) Document all acceptance testing, calibration and correction procedures described herein with the following information:
  - b) Parameters measured and their values, including values measured prior to calibration or correction, as applicable.
  - c) Parameters associated with calibration or corrective networks, components, or devices.
  - d) All software shall have certified backups and escrow provisions reviewed with the Owner and/or Owner's representative and equipment supplier.
  - e) Provide all operational software, configuration files, source code, and final settings and adjustment, in Compact Disc format, sleeved in the final documentation binder. The configurations, and source code become the sole property of the owner at project completion
  - f) A list of all equipment, indicating manufacturer, model number, serial number and equipment location (rack/room number). Update following acceptance testing if modified.
- (D) Present, review and clarify all materials to the Owner and/or Owner's representative and/or operating personnel and fully demonstrate the operation and maintenance of the systems, equipment, and devices specified herein.
- (E) Check, inspect, and if necessary, adjust all systems, equipment, devices and components specified, at the Owner's convenience, approximately thirty (30) days after the Owner acceptance of this work.

END OF SECTION